

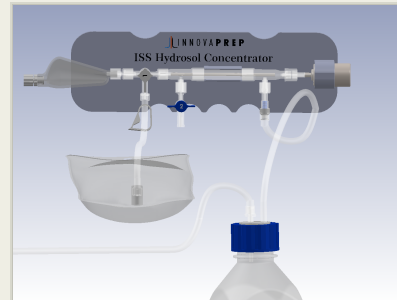
# Rapid Concentration for Improved Detection of Microbes in ISS Potable Water, Phase I

Completed Technology Project (2015 - 2015)



## Project Introduction

Providing a reliable supply of safe drinking water is a critical requirement for space exploration. Systems that provide recycled, treated water aboard the International Space Station, & that will supply water aboard future spacecraft, are inherently complex and can be susceptible to biofilm formation and microbial contamination. Further, it has been noted that pathogenicity and virulence of microbes can increase in microgravity environments. These factors, along with the high consequence of sickness in the remote space environment, make rapid & reliable methods of detecting microbes at low levels a critical need. Rapid microbiological detection systems have taken dramatic steps forward in the last two decades and today detection of even a single organism is possible in less than one hour. Unfortunately, development of rapid detection methods has far outpaced development of sample concentration techniques, which are necessary to enable detection of low microbial concentrations in drinking water. Currently, without sample concentration, rapid detection techniques alone produce results that are hundreds to thousands of times less sensitive than the minimum desired detection limit for microbial water contaminants. InnovaPrep proposes development of a rapid microbial concentration system designed for use aboard the International Space Station. The system will concentrate microbes from up to 5 Liters of potable water into volumes as small as 200  $\mu\text{L}$  – providing concentration factors as high as 15,000X. It will be based on technologies developed and commercialized by InnovaPrep, but will contain innovations to allow for operation in microgravity. Large volumes of potable water are processed through a hollow fiber membrane filter concentration cell as microbes are captured within the lumen of the fibers. Following capture, the microbes are efficiently eluted using a novel Wet Foam Elution process and then delivered to a rapid detection system for analysis.



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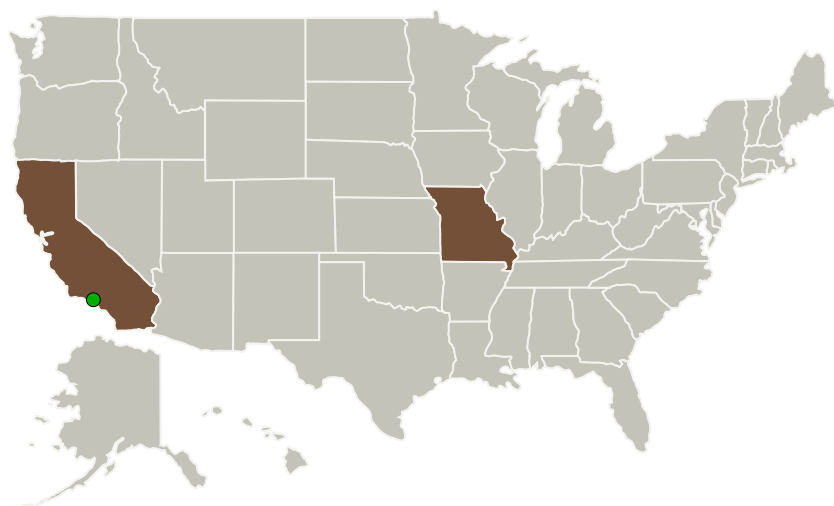
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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
InnovaPrep, LLC	Lead Organization	Industry	Drexel, Missouri
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

### Primary U.S. Work Locations

California	Missouri
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## Project Transitions

**June 2015:** Project Start**December 2015:** Closed out

**Closeout Summary:** Rapid Concentration for Improved Detection of Microbes in ISS Potable Water, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/139262>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

InnovaPrep, LLC

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Andrew E Page

**Co-Investigator:**

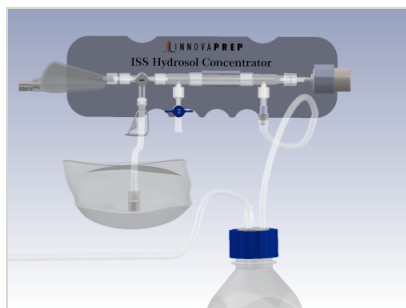
Andrew W Page

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## Images

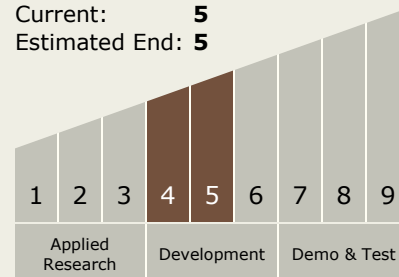


### Briefing Chart Image

Rapid Concentration for Improved Detection of Microbes in ISS Potable Water, Phase I  
(<https://techport.nasa.gov/image/136452>)

## Technology Maturity (TRL)

Start: 4  
Current: 5  
Estimated End: 5



## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System